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Part II

Department of Transportation

Federal Aviation Administration

Transport Category Airplanes; Cabin Ozone Concentration

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 25 and 121

[Docket No. 22438; Notice No. 81-15]

Transport Category Airplanes; Cabin Ozone Concentration

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking.

SUMMARY: This notice proposes to relieve operators of certain airplanes from having to purchase, install, and maintain ozone control equipment or establish ozone avoidance procedures. This proposal will reduce the operating cost of the affected airplanes with no reduction in flight safety. This notice also responds to a petition for rulemaking from the Air Transport Association of America and to a petition from Rosenbalm Aviation, Inc.

DATES: Comments must be received on or before January 22, 1982.

ADDRESSES: Send comments on this proposal in duplicate to: Federal Aviation Administration, Office of the Chief Counsel, Attn: Rules Docket (AGC-204), Docket No. 22438, 800 Independence Avenue, SW, Washington, D.C. 20591; or deliver comments in duplicate to: FAA Rules Docket, Room 916, 800 Independence Avenue, SW, Washington, D.C. Comments may be examined in the Rules Docket weekdays, except Federal holidays, between 8:30 a.m. and 5 p.m.

FOR FURTHER INFORMATION CONTACT: Joseph A. Sirkis, Regulatory Projects Branch (AVS-24), Safety Regulations Staff, Associate Administrator for Aviation Standards, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, D.C. 20591, telephone (202) 755-8716.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments as they may desire. Comments that provide the factual basis supporting the views and suggestions presented are particularly helpful in developing reasoned regulatory decisions on the proposal. Comments are specifically invited on the overall regulatory, economic, environmental, and energy aspects of the proposals. Communications should identify the regulatory docket or notice number and be submitted in duplicate to the address listed above. Commenters wishing the FAA to acknowledge receipt of their comments on this notice must submit with those comments a self-addressed, stamped postcard on which the following statement is made: "Comments to Docket No. 22438." The postcard will be date/time stamped and returned to the commenter. All communications received on or before the closing date for comments will be considered by the Administrator before taking action on the proposed rule. The proposals contained in this notice may be changed in the light of comments received. All comments submitted will be available for examiniation in the Rules Docket both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerned with this rulemaking will be filed in the docket.

Availability of NPRM

Any person may obtain a copy of this notice of proposed rulemaking (NPRM) by submitting a request to the Federal Aviation Administration, Office of Public Affairs, Attention: Public Information Center, APA-430, 800 Independence Avenue, SW, Washington, D.C. 20591, or by calling (202) 426-8058. Communications must identify the notice number of this NPRM. Persons interested in being placed on a mailing list for future NPRM's should also request a copy of Advisory Circular No. 11-2, Notice of Proposed Rulemaking Distribution System, which describes the application procedures.

Discussion of Proposed Rule

Background

The Federal Aviation Administration (FAA) has established specific airplane cabin ozone concentration standards for the issuance of type certificates for transport category airplanes. Cabin ozone standards were also adopted for the operation of large transport category airplanes by air carriers and commercial operators. The final rule was published in the **Federal Register** on January 21, 1980 (45 FR 3880), as Amendments 25-20 and 121-154.

Amendment 25-20 added a new § 25.832 which stated that the airplane cabin ozone concentration during flight above flight level (FL) 180 must be shown not to exceed 0.25 parts per million by volume, sea level equivalent, at any time and 0.1 parts per million by volume, sea level equivalent, time-weighted average during any 3-hour interval.

Amendment 121-154 added a new § 121.220 which was later changed to § 121.578 stating that after February 20, 1981, no certificate holder may operate a transport category airplane above FL 180 unless it has successfully demonstrated to the Administrator that the concentration of ozone inside the cabin will not exceed 0.25 parts per million by volume, sea level equivalent, at any time and for each flight segment that exceeds 4 hours, 0.1 parts per million by volume, sea level equivalent, time-weighted average over that flight segment.

This notice is based in part on a petition for rulemaking from the Air Transport Association of America (ATA) dated April 30, 1980, which was published in the **Federal Register** on September 11, 1980 (45 FR 59905), and a petition from Rosenbalm Aviation, Inc., dated March 31, 1980, which was published in the **Federal Register** on October 9, 1980 (45 FR 67100). All interested persons have been given an opportunity to comment on those petitions, and due consideration has been given to all matters presented. As a result of the comments received and further consideration by the FAA, this notice proposes amendments to §§ 25.832 and 121.578 of the Federal Aviation Regulations to relieve operators of certain airplanes from the necessity of meeting the existing regulatory requirements and to simplify the compliance requirements for many other airplane operations.

Petitions for Rulemaking

The ATA petition contends that § 121.578 should be changed to exclude certain aircraft from the ozone rule. The requested exclusions are for cargo-only aircraft, narrow-body four-engine jet aircraft scheduled for either early retirement or re-engining, and narrow-body two-engine and three-engine jet aircraft. Nine comments were received on the ATA petition from airlines, aircraft manufacturers, and employee unions. Two comments indicate agreement with the ATA petition while four comments respond unfavorably to the petition. Of the three remaining comments, two favor the exclusion of cargo-only aircraft, and one of these also favors excluding the four-engine jet aircraft. The final comment suggests measured ozone retention ratios on Boeing airplanes and uses these values to support the exclusion of narrow-body two-engine and three-engine jet aircraft. One commenter also requests that the rule apply only to airplanes which operate above FL 250 while another requests that the rule apply only to airplanes with a maximum gross weight of over 75,000 pounds.

The petition by Rosenbalm Aviation, Inc., requests exclusion of cargo-only jet aircraft from the provisions of § 121.578. One comment from a flight attendants' union strongly recommends that the petition be denied because one of the symptoms of ozone exposure is chest pain and obviously, it is asserted, the reason for a lack of service reports is that pilots are reluctant to report such pain.

The three categories of exclusion requested by ATA will be discussed along with comments and resulting proposed action by the FAA. The Rosenbalm petition will be discussed along with that portion of the ATA petition requesting exclusion of cargo-only aircraft.

(1) *Cargo-only airplanes.* The ATA petition requests cargo-only aircraft be excluded because of the absence of impact on passengers and flight attendants and the absence of ozone occurrences in service reports from flight crewmembers. It also states that exclusion would provide equal treatment with non-Part 121 operators.

An extensive comment on this portion of the petition was received from Federal Express Corporation. The comment notes that the occupants of cargo-only aircraft are sedentary; therefore, unlike flight attendants who move throughout the aircraft cabin, they are less likely to experience the increase of ozone discomfort that comes with physical activity. It further states that the symptoms of ozone exposure are known, as are the conditions (latitudes, altitudes, and seasons) where higher levels of ozone are most likely to occur. If symptoms and conditions warrant, it recommends reducing cruising altitude or using 100 percent oxygen to alleviate any physical discomfort from excessive ozone in the cockpit. It also states that the economic cost of planning altitude restrictions which would guarantee ozone avoidance or, installing ozone filters, is excessive.

Three groups representing airline employees object to exempting cargo-only aircraft from the ozone rule based on the deleterious effects of ozone on all flight crewmembers, not just flight attendants.

The Rosenbalm petition requests exclusion of large cargo-only jet aircraft not carrying flight attendants or passengers for hire. The request is based on the fuel loss resulting from carrying new equipment which would be required for compliance and the lower physical activity of cockpit crewmembers compared to flight attendants. The petitioner also indicates that these airmen can be presumed to have lower affinity for ozone discomfort because, unlike passengers, they must meet physical qualifications for flying.

In commenting on the Rosenbalm petition, the Independent Union of Flight Attendants states that while cargo aircraft do not carry passengers and flight attendants, they do carry pilots, and ozone exposure is not merely a discomfort but a health hazard. It recommends that the petition be denied based on the deleterious effects of ozone exposure.

The FAA recognizes the concerns expressed by the groups recommending denial of these petitions. However, since the flights in question are cargo operations, the FAA concludes that there is sufficient reason to exclude cargo-only airplanes from § 121.578 based in part on the facts that (a) cargo-only airplane flight crewmembers are sedentary and therefore less likely to experience adverse effects from ozone exposure, (b) flightcrews are required to meet rigorous medical standards, (c) symptoms of excessive ozone exposure can be recognized, (d) flight conditions for likely excess ozone are known, and (e) precautionary action (either reduced altitude or 100 percent oxygen or both) may be used if symptoms or conditions warrant.

For these reasons, it is proposed to exclude from the provisions of § 121.578 cargo-only aircraft which carry only flight crewmembers and persons authorized to be carried in § 121.583 without compliance with the revenue passenger-carrying requirements of Part 121. For example, the following authorized persons may be carried: company employees and their dependents, government inspectors, persons necessary for safety of flight or special handling of cargo, and members of the armed forces.

(2) *Narrow-body, four-engine jet airplanes scheduled for early retirement or re-engining.* These airplanes will be retired from service or re-engined to satisfy the noise standards of Part 91, Subpart E, by December 31, 1984. The ATA petition states that these long-range airplanes would most likely install ozone filters as the compliance option. The ATA states that designing, testing, certificating, fabricating, and installing ozone filters in engines currently in use would take until mid-1983. This would almost coincide with the compliance date for the noise retrofit rule, at which time new quieter engines will be installed or the airplanes will be retired. Almost all resources spent on modifying existing aircraft would be lost and not transferrable to the air conditioning designs associated with the new engines.

Favorable comments cite excessive cost for a short airplane or engine lifetime while unfavorable comments emphasize unnecessary ozone exposure if the petition is granted.

The FAA has determined that ozone filters cannot be installed on all affected airplanes before January 1, 1985. As discussed in the regulatory evaluation for this proposal, a copy of which is available in the Rules Docket, this aircraft fleet has very low utilization, is not used often at higher latitudes, and will either be re-engined or retired by the end of 1984 due to fuel-inefficient engines and their failure to meet the noise standards.

Compliance by altitude restriction for these inefficient older aircraft would be too costly and wasteful of fuel. For these reasons, the FAA has concluded the potential benefit to society in the limited circumstances in which these aircraft might encounter high-altitude ozone is outweighed by the costs to society of installing this equipment. Therefore, the FAA is proposing that narrow-body, four-engine airplanes be excluded from § 121.578 requirements until they are either re-engined to satisfy Part 91, Subpart E, Operating Noise Limits, or retired prior to required compliance with that subpart.

(3) *Narrow-body two-engine and three-engine jet airplanes.* The ATA petition requests excluding narrow-body, two-engine and three-engine jet airplanes based on the estimated total cost of installing ozone filters on these airplanes. The petitioner bases its expectation that ozone filters would need to be installed on an analysis and rejection of the four alternative methods for showing compliance. In calculating altitude restrictions that would be necessary for aircraft without filters, ATA adhered to strict assumptions for aircraft without established ozone retention ratios.

Of the comments received on this proposal, those submitted by the airlines and aircraft manufacturers are favorable, and those submitted by representatives of airline employees are unfavorable. The comments of the Boeing Commercial Airplane Company were particularly helpful, in that they provided measured values for the retention ratios (ratio of ozone in the cabin to the ambient atmosphere ozone) on Boeing 707/720, 727, and 737 airplanes. These values range from 0.45 to 0.51 in the passenger cabin and are lower than anticipated, resulting in lower predicted cabin ozone values. Boeing used these data to show that ozone concentrations greater than the maximum value permitted by § 121.578

"would occur only on a few routes in the peak ozone activity periods in the northern latitudes and at high altitudes."

Prior to the test data supplied by Boeing, the FAA required operators to use a maximum retention ratio when computing cabin ozone concentrations which made showing compliance more difficult. The retention ratio data supplied by Boeing (and other data accepted by the FAA) indicate that virtually all flights using this type of equipment can show compliance with the ozone rule without restricting altitude or installing ozone filters. In those few cases where an altitude limitation might become necessary for compliance, not every flight would have reduced fuel efficiency. A portion of these, however, could incur a minimal economic burden in the form of reduced fuel efficiency of less than 1 percent. Cases in which altitude reduction might be necessary would involve Alaskan operations for only 3 months where the ideal flight profile would utilize the highest possible altitude.

Generally, compliance will not require altitudes below those of typical operations. For those flight which might encounter slightly elevated ozone levels, the FAA concludes that the public benefit of ozone avoidance outweighs the burden imposed on the operator. Accordingly, this portion of the ATA petition is denied.

Clarification of Altitude Requirements

Since the ozone rule was published, it has come to FAA's attention that demonstrating compliance using atmospheric ozone statistics is more difficult than anticipated. While Advisory Circular No. 120–38, Transportation Category Airplanes Cabin Ozone Concentrations, gives specific examples of the methodology required, it does not alleviate this problem.

To facilitate compliance, the following changes in § 121.578 are proposed:

(1) *Retention ratio.* In the past, the FAA required operators of airplanes without established retention ratios to use strict assumptions regarding the retention ratio when calculating the cabin ozone concentrations using ozone statistics. Based on retention ratios measured in a variety of aircraft since the ozone rule was published (including the Boeing data already discussed), the FAA will accept a value of 0.7 for the airplane retention ratio when computing cabin ozone concentrations even when a retention has not been measured for that particular airplane. This is expected to facilitate compliance in a significant number of cases.

(2) *Flight level 180.* The current regulation requires compliance only for flights above FL 180. FL 180 was chosen as the altitude that would ensure a separation of the upper atmosphere-controlled ozone region (where natural ozone is manufactured by the sun) from that region where a significant portion of the ozone is derived from human activities, especially near large urban areas. Since ozone formed near the ground by human activities is unpredictable, then time-weighted average ozone values are determined using statistical ozone values only for operations above FL 180. This proposal would provide that ozone values below FL 180 are considered to be zero.

Using the method outlined in Advisory Circular No. 120–38 and the ozone statistics of Report No. FAA–EQ–78–03, Guidelines for Flight Planning During Periods of High Ozone Occurrence, the FAA has determined that flight levels below which natural ozone concentrations would not be expected to exceed the limits established by § 121.578 can be determined and new compliance altitudes established. Assuming a pressurized cabin altitude of 7,000 feet and a newly established retention ratio of 0.7, these flight levels are FL 320 for compliance with the maximum value and FL 270 for compliance with the time-weighted average value. The highest statistical ozone values in the United States were used for these calculations (May, Western North America, 65°N).

The FAA is therefore proposing to change §§ 121.578(b) and 25.832(a) to provide that compliance must be shown with the 0.25 parts per million by volume (ppmv) maximum value for flights above FL 320 and with the 0.1 ppmv time-weighted average ozone value for flights above FL 270. Under § 121.578, the time-weighted average ozone value will still be computed using a value of zero for ozone concentrations below FL 180.

(3) *Altitude restrictions for flights under 4 hours.* Table 1 shows the retention ratios which have been measured and accepted by the FAA on a number of airplanes since the ozone rule was published. The values given for passenger exposure are measured in the airplane cabin and apply to passenger or both cargo and passenger airplanes. The values for cargo airplanes are measured on the flight deck and are for cargo-only airplanes.

Using these retention ratios, altitude restrictions required for compliance with the maximum ozone value (0.25 ppmv) established by § 121.578 can be calculated using the ozone statistics of Report No. FAA–EQ–78–03 and Advisory Circular No. 120–38. For a cabin altitude of 7,000 feet with no ozone filter, Equation 1 of the Advisory Circular can be written as $OZMAX=(0.77)R(OZ16)$ where—

OZMAX is the permissible maximum ozone concentration inside an airplane cabin as established by § 121.578;

0.77 is the ratio of cabin pressure to sea level pressure for a cabin altitude of 7,000 feet;

OZ16 is the estimated ambient ozone concentration obtained from statistics with a confidence level of 84 percent; and

R is the retention ratio of the ozone which enters the airplane cabin after going through the air conditioning system and, in most cases, the engines to the ambient (outside) ozone.

TABLE 1.—MEASURED RETENTION RATIOS ACCEPTED BY THE FAA FOR DEMONSTRATING COMPLIANCE WITH § 121.578

Manufacturer	Model	Certificated altitude	Passenger	Cargo	Comments
Boeing	B-707/720	42,000	0.51	0.44	
Boeing	B-727	42,000	0.45	0.42	
Boeing	B-737	37,000	0.50	0.50	Normal certified altitude is 35,000 with optional certified altitude of 37,000.
Boeing	B-747	45,000	0.465	0.465	For use with airplanes equipped with catalytic ozone converters.
Boeing	B-747SP	45,000	0.552	0.552	For use with airplanes equipped with catalytic ozone converters.
Lockheed	L-1011	42,000	0.59	0.59	
Douglas	DC-9	37,000	0.43	0.43	Only the DC-9-80 is certified to 37,000. All other DC-9's certified to 35,000.
Douglas	DC-10	42,000	0.57	0.57	Three air conditioning packs operating.
Douglas	DC-10	42,000	0.47	0.41	Two air conditioning packs operating.

For OZMAX of 0.25 ppmv as established by § 121.578, the value for 0Z16 becomes (0.325)/R and can be calculated using the FAA-accepted values of R for each airplane type. Table 2 shows the maximum flight levels that

can be obtained by using these 0Z16 values and Report No. FAA–EQ–78–03 for each month in the following geographical areas: (1) Eastern continental United States, (2) Western continental United States, and (3) Western North America at latitudes higher than the continental United States. (Note: continental United States is defined as the 48 contiguous states.)

Also shown in Table 2 are the maximum flight levels for an airplane with a retention ratio of 0.7 which, as already noted, is an acceptable value to use if the actual ratio has not been measured.

TABLE 2.—MAXIMUM FLIGHT LEVEL WHICH CAN BE FLOWN TO SHOW COMPLIANCE WITH THE MAXIMUM OZONE CONCENTRATION ESTABLISHED BY § 121.578 USING OZONE STATISTICS WITHOUT AN OZONE FILTER

[0.25 parts per million by volume]

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
Eastern Continental United States												
DC–9												
B–737												
B–727 (pax)						410	410	400	410			
B–727 (cargo)								410				
DC–10 (3 Packs)					410	390	380	360	380			
DC–10 (pax—2 packs)						410	410	400	410			
DC–10 (cargo—2 packs)								410				
L–1011					410	390	380	360	380	410		
B–707/720 (pax)						400	400	390	400			
B–707/720 (cargo)								400				
R=0.7	460	440	420	410	390	370	360	340	350	390	430	450
Western Continental United States												
DC–9												
B–737												
B–727								390	390			
B–727 (cargo)								400	400			
DC–10 (3 Packs)							400	360	380	400		
DC–10 (pax—2 packs)								390	390			
DC–10 (cargo—2 packs)								410	410			
L–1011							390	360	380	390		
B–707/720 (pax)								380	380			
B–707/720 (cargo)								400	400			
R=0.7	470	460	430	440	410	410	370	340	340	370	410	450
Western North America at Latitudes Higher Than the Continental United States												
DC–9						360	360	360				
B–737						350	350	350	350	360		
B–727 (pax)				400	400	360	350	360	370	370	390	
B–727 (cargo)				410	410	370	360	370	380	380	400	
DC–10 (3 Packs)		400		390	370	340	340	340	340	350	360	
DC–10 (pax—2 packs)				400	400	360	350	360	370	370	390	
DC–10 (cargo—2 packs)				410	410	370	360	370	390	380	410	
L–1011		400		390	370	340	340	340	340	350	360	410
B–707/720 (pax)		410		400	390	350	340	350	350	360	380	
B–707/720 (cargo)				410	400	360	350	360	380	370	400	
R=0.7	400	370	400	370	350	330	330	330	320	340	340	390

Flight at or below the altitudes shown in Table 2 complies with the maximum cabin ozone standard established by § 121.578. Specifically, if the airplanes of concern in the ATA petition (DC–9, B–737, and B–727) do not exceed FL 390 in the continental United States, they comply with the maximum cabin ozone standard. The flight levels in Table 2 do not apply if an ozone filter is installed or to the time-weighted average ozone values established by § 121.578 for aircraft operations over 4-hour duration.

Use of Table 2 for showing compliance with the maximum allowable ozone concentration based on altitude, latitude, and month will relieve most operators from performing the detailed calculation which would otherwise be required.

The Proposed Amendment

Accordingly, the Federal Aviation Administration proposes to amend the Federal Aviation Regulations (14 CFR §§ 25.832 and 121.578) as follows:

PART 25—AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES

1. By revising § 25.832(a) (1) and (2) to read as follows:

§ 25.832 Cabin ozone concentration.

(a) The airplane cabin ozone concentration during flight must be shown not to exceed—

(1) 0.25 parts per million by volume, sea level equivalent, at any time above flight level 320; and

(2) 0.1 parts per million by volume, sea level equivalent, time-weighted average during any 3-hour interval above flight level 270.

* * * * *

PART 121—CERTIFICATION AND OPERATIONS: DOMESTIC FLAG, AND SUPPLEMENTAL AIR CARRIERS AND COMMERCIAL OPERATORS OF LARGE AIRCRAFT

2. By amending § 121.578 by revising (b) and by adding a new paragraph (e) to read as follows:

§ 121.578 Cabin ozone concentration.

* * * * *

(b) Except as provided in paragraphs (d) and (e) of this section, no certificate holder may operate a transport category airplane above the following flight levels unless it has successfully demonstrated to the Administrator that the concentration of ozone inside the cabin will not exceed—

(1) For flight above flight level 320, 0.25 parts per million by volume, sea level equivalent, at any time above that flight level; and

(2) For flight above flight level 270, 0.1 parts per million by volume, sea level equivalent, time-weighted average for each flight segment that exceeds 4 hours and includes flight above that flight level. (For this purpose, the amount of ozone below flight level 180 is considered to be zero.)

* * * * *

(e) A certificate holder need not comply with the requirements of paragraph (b) of this section for an aircraft—

(1) When the only persons carried are flight crewmembers and persons listed in § 121.583;

(2) If the aircraft is scheduled for retirement before January 1, 1985; or

(3) If the aircraft is scheduled for re-engining under the provisions of Subpart E of Part 91, until it is re-engined.

(Secs. 313, 601, 603, and 604, Federal Aviation Act of 1958, as amended (49 U.S.C. 1354, 1421, 1423, and 1424); sec. 6(c), Dept. of Trans. Act (49 U.S.C. 1655(c); and 14 CFR 11.45)

Note.—This proposal relieves certain operators of the economic burden of purchasing, installing, and maintaining ozone control equipment or establishing ozone avoidance procedures. Accordingly, the FAA has determined that this document involves a proposed regulation which is not major under Executive Order 12291 or significant under DOT Regulatory Policies and Procedures (14 CFR 11034; February 26, 1979). For the same reasons, it has been determined under the criteria of the Regulatory Flexibility Act that this proposed rule, at promulgation, will not have a significant impact on a substantial number of small entities. A copy of the draft regulatory evaluation for this action is contained in the regulatory docket. A copy of it may be obtained by contacting the person identified under the caption "FOR FURTHER INFORMATION CONTACT."

Issued in Washington, D.C. on October 19, 1981.

Kenneth S. Hunt,

Director of Flight Operations.

[FR Doc. 81-33453 Filed 11-20-81; 8:45 am]

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